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A scheme of student cognitive growth is suggested by a combination of Piaget's developmental stages and Bruner's imagery-related stages: the concrete level, for which imagery is not necessary; the concrete-imagery level, with imagery for enrichment of the concrete; the representational level, for which imagery is needed to make the translation to the concrete; and the abstract-imagery and abstract levels, for which language can be substituted for the concrete. The teacher can deal with students at differing levels of cognitive maturity by planning classroom activities on a lower level (since a student can function on any level below the highest achieved), however, the student should be exposed to higher forms of cognition to encourage cognitive growth. To determine those behaviors necessary for planning and assessing imagery in the classroom, a Taxonomy of Image Provoking Teacher Behavior with behaviors appropriate to each cognitive level was created along with a classroom observation instrument (the Taxonomy of Image Provocation Profile) which was formulated from the taxonomy. This instrument provides a qualitative and quantitative measure of a specific area of teacher behavior and suggests many areas of research possibilities. At West Virginia University the TIP Profile has been used as a behavior guide and for self-evaluation by preservice teachers as well as an instrument of objective analysis of teacher behavior. (SM)

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A SYSTEM FOR PLANNING AND ASSESSING IMAGERY IN THE CLASSROOM TEACHING - LEARNING SITUATION

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Presented at the 1969 meeting of the
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A SYSTEM FOR PLANNING AND ASSESSING IMAGERY IN THE CLASSROOM TEACHING - LEARNING SITUATION

It would be relevant at this time to briefly review the more pertinent logic leading to the formation of the observational instrument to be described here and, subsequently, to suggest implications for the instructional areas; systematic observation; and teacher training in particular.

During 1967 and 1968, the writer undertook the task of investigating the role of imagery in teaching and learning. By imagery is meant a conscious mental representation of a perceivable, absent, or non-existent object, process, or concept. A person experiencing visual imagery for example can be said to be mentally looking at pictures. Likewise, an individual hearing a popular song continuously running through his mind is experiencing auditory imagery. Other types of imagery exist. The literature over a 65 year span, from Galton in 1883 to the present, is uniform in recognizing that the majority of students have mental imagery. In the light of current thought in the area of human development it is apparent that the appearance and utilization of imaging ability dovetails exactly with the development and attainment of certain cognitive levels. The developmental levels expoused by Piaget and Bruner are especially applicable.

The developmental levels of Piaget, proceding from sensorimotor to the stage of formal operations, and those of Bruner, proceding from enactive to symbolic, have this in common; they both suggest a concrete to abstract continuum. The emphasis by Bruner (1966) on the utilization of imagery in what he terms the ikonic level provides a key to a closer merging of imagery and the developmental level concept. The point Bruner makes is that imagery is necessary in order to relate an ikonic "representation" to that which it represents. A student must be able to mentally picture a cat in order to comprehend a vague line drawing of the animal.

The writer then, on the basis of the literature and his classroom experiences, reasoned as follows: According to Piaget a continuum of cognitive growth exists

with students varying as to their cognitive maturity, that is, their level on the developmental continuum. According to Bruner, imagery is necessary at certain levels of cognitive growth and helpful at other; therefore, a scheme of cognitive growth can be advanced with both incorporates and adds to the developmental stages of Piaget and the imagery related stages of Bruner. The writer has formulated such a scheme as follows:

Concrete level

Concrete-imagery level

Representational level

Abstract-imagery level

Abstract level

The terms concrete, representational, and abstract are used by the writer to encompass the entirety of the cognitive development continuum. These terms do not suggest a different course of development than that postulated by Piaget but are thought by the writer to be more conducive to the relating of the continuum to imagery as these terms reflect the predominant mode of behavior at each general level. A brief description of some important aspects of each of the foregoing levels in the writer's version of the cognitive growth continuum would be useful at this point.

The Concrete Level

Initially, children are not able to deal with that which is not present. During this stage actions and reactions are based on available perceptions. During early childhood, concrete experiences are predominately most meaningful because the child cannot deal effectively with that which is not present at the time. For that matter, imagery is not necessary to function on this level. A person does not need an image of a fish when a fish is being viewed. As was

pointed out by Ausubel (1963), if an older child on a higher level of development, or even an adult on the abstract level, has not had certain actual concrete experiences, he cannot deal initially with these areas on a higher level.

The Concrete-Imagery Level

As the child matures further he can begin to mentally speculate about that which he perceives. The child will imitate the sound of an animal, the whistling of a tea kettle or the staccato beat of a drum while observing the mute object. Thus, with imagery, immediate perceptions can be enriched. The starting point, however, in this stage is always the concrete experience. Enriching his perceptions with imagery, the child begins to achieve reversibility. Reversibility could be accomplished completely, for example, when the child could break a piece of clay in two pieces and visualize its original state. The development of imaging ability is necessary then for this level. As this imaging ability becomes highly sophisticated, the child reaches the representational level.

The Representational Level

As Bruner (1966) points out, in order for a child to deal with that which is completely absent in its concrete form by substituting a representation, it is necessary for him to utilize imagery to make the translation from the representation to the actual object. For what Bruner calls ikonic representation, the writer has substituted the term representational. A child on the representational level can utilize charts and graphs and will understand a road map. Pictures of objects will completely suffice and what happens to a picture book character can be vicariously experienced by the child through imagery. A child will stretch his arms out to represent an airplane and will go zooming around the room. A representation of a soft drink such as a Coca-Cola sign will often provoke an intense enough gustatory image in the child to present a problem to an accompanying adult.

The Abstract Levels

The writer uses the term abstract level much as Bruner uses symbolic and Piaget uses the Stage of Formal Operations. In the two abstract stages, according to the writer's system, verbal or written language can be wholly substituted for the concrete by the student. It must be pointed out that two types of language behaviors are possible, one utilizing a purely abstract verbalization and a second behavior composed of image-accompanied verbalizations. The latter being less abstract, since it is closer to the concrete, can be grouped separately. As Ausubel (1963) points out, transitions between levels are gradual and stages overlap. The growing abstract language development of a child in the preoperational stage is necessarily accompanied by a high degree of imagery. Verbal descriptions given by elementary students are notably rich in image-provoking content as are verbal descriptions and essays on the secondary level. The radio jingle, "taste that beats the others cold," to sell a cola is aimed at the abstract-imagery level.

The use by teenagers of sayings gleaned from television, such as "Here comes de judge"; "Sorry about that, Chief"; "Sock it to me"; are consistent with the use of imagery rich abstractions typical of this level. Thus, an individual, who has reached the inital stage in which abstractions predominate, couples abstractions with images. Students at the high school age are in transition into the fifth stage where abstractions may be predominately used without recourse to imagery. This transition is rarely completed until mature adulthood is reached and even then, while the individual can perform on this level for extended periods of time, this rarely occurs unless some factor such as an extremely abstract occupation is present. The writer questions then that adults in general, much less high school students, can be found to perform frequently enough on this highest abstract level to justify saying that this stage is predominant in the majority of adults.

Cognitive Development and the Teacher-Student Relationship

Two points may be emphasized with respect to the relationship between developmental levels as previously described and the student-teacher relationship. First, although students may be on different levels of development in different subject areas, the teacher is conceded to confront more individual differences between students as they enter still higher grades. At almost any grade level, however, the teacher will be faced with students who represent various levels of cognitive maturity and thereby necessitate differing levels of teacher behavior in order to allow for these individual differences. Second, an individual may perform on any level of cognitive maturity below the highest level achieved. Difficulties occur not when a student who has achieved an abstract level in some area is presented concrete experiences but when the reverse occurs.

A teacher faced with, but not aware of or prepared to deal with, the individual differences in cognitive maturity present in the classroom may present material on a level appropriate for only part of the class, going over the heads of the rest. Nearly all high school chemistry students, for example, perform well with material requiring the representational level hence one solution for a chemistry teacher would be to plan classroom activities on this level common to the entire class since those students on levels above the representational can "drop down" with ease.

The teacher is not doing students any favors when he consistently institutes activities on the lowest level common to all students. Although this procedure may result in immediate understanding by all, students subjected to this procedure may not reach higher levels of cognitive maturity as soon as they otherwise might.

The teacher should tempt the student into higher stages of development by exposing him to more advanced forms of cognition.

Evaluation of Teacher Performance

On the basis of the relationships just discussed, the writer concludes that before it is possible to determine the desirability of a teacher's behavior with regard to the areas of cognition discussed here, two measurements must be made. The level on which the teacher is pitching the subject, and the level of cognitive maturity achieved by the students must both be determined. The instrument produced by the writer may be used only to determine the teacher's level of presentation.

CLASSIFICATION OF IMAGE PROVOKING BEHAVIOR

In view of the writer's cognitive development classifications produced from consideration of the literature and classroom observation, teacher behavior consistent with each level of development can be discerned. A teacher then could plan for and present the student with experiences on any or all of the five levels described. With respect to imagery, the teacher presenting purely abstract or purely concrete experiences is not provoking imagery in most students. This points to the feasibility of grouping teacher behavior into image provoking and nonimage provoking classifications. It can be seen that the teacher presenting concrete-imagery, representational, and abstract-imagery experiences does provoke imagery in those students who have achieved these respective levels of cognitive growth and this grouping would constitute the imagery grouping. Combining the possible modes of imagery with the image provoking levels yields the following Taxonomy of Image Provoking Teacher Behavior:

1.00 Concrete-imagery

- 1.10 Teacher provides concrete experiences to provoke visual imagery.
- 1.20 Teacher provides concrete experiences to provoke auditory imagery.

1.30 Teacher provides concrete experiences to provoke organic, kinesthetic, or tactual imagery.

1.40 Teacher provides concrete experiences to provoke olfactory imagery.

1.50 Teacher provides concrete experiences to provoke gustatory imagery.

2.00 Representational

2.10 Teacher provides representational experiences to provoke visual imagery.

2.20 Teacher provides representational experiences to provoke auditory imagery.

2.30 Teacher provides representational experiences to provoke organic, kinesthetic, or tactual imagery.

2.40 Teacher provides representational experiences to provoke olfactory imagery.

2.50 Teacher provides representational experiences to provoke gustatory imagery.

3.00 Abstract-Imagery

3.10 Teacher provides abstract experiences to provoke visual imagery.

3.20 Teacher provides abstract experiences to provoke auditory imagery.

3.30 Teacher provides abstract experiences to provoke organic, kinesthetic, or tactual imagery.

3.40 Teacher provides abstract experiences to provoke olfactory imagery.

3.50 Teacher provides abstract experiences to provoke gustatory imagery.

The order of the modes of imagery follows the frequency with which the type is encountered in the literature, with visual imagery being most predominant and gustatory imagery being least encountered.

Organic, kinesthetic, and tactual imagery are difficult to separate as all are related somatic functions. For the purposes of this taxonomy then, they have been grouped together.

Formulation Of A Teacher Observation Instrument

The foregoing taxonomy was transformed into an observational instrument utilizing a sign system. A reliability study produced data suggesting high

reliability and validity and supported the ability of the instrument to discriminate between teachers.

The completed observational instrument was termed the Taxonomy of Image Provocation Profile (TIP Profile) and is as follows:

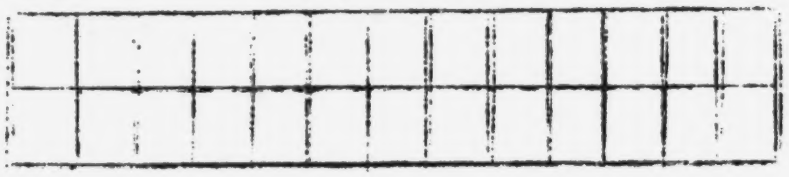
Directions

The Taxonomy of Image Provocation Profile provides a means of observing and recording the image provoking behavior of the teacher in the classroom. Your role as an observer is to watch and listen for signs of the behavior described, and to record whether or not it was present.

There are twelve (12) separate 2-minute observation periods in each 24 minute visit to the classroom. During each of the two minute observation periods place a check mark in an appropriate imagery level category as the behavior is exhibited. Only if no imagery is provoked during the 2-minute period should the PROVOKES NO IMAGERY section be marked. At the end of the 12th. marking period add up the totals for each classification and record these in the first column, headed TOT.

TAXONOMY OF IMAGE PROVOCATION PROFILE

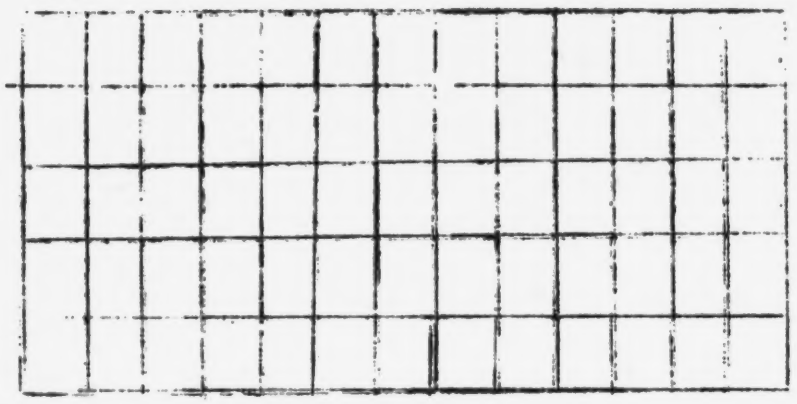
TOT PROVOKES NO IMAGERY



.0 USES CONCRETE WITHOUT IMAGERY

.00 USES ABSTRACT WITHOUT IMAGERY

TOT 1.00 USES CONCRETE TO PROVOKE IMAGERY



1.10 PROVOKES VISUAL IMAGE

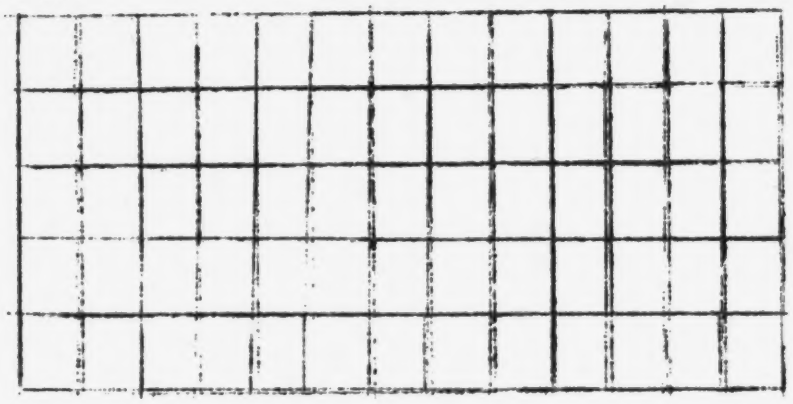
1.20 PROVOKES AUDITORY IMAGE

1.30 PROVOKES ORG, KIN, OR TACT IMAGE

1.40 PROVOKES OLFACTORY IMAGE

1.50 PROVOKES GUSTATORY IMAGE

TOT 2.00 USES REPRESENTATION TO PROVOKE IMAGERY



2.10 PROVOKES VISUAL IMAGE

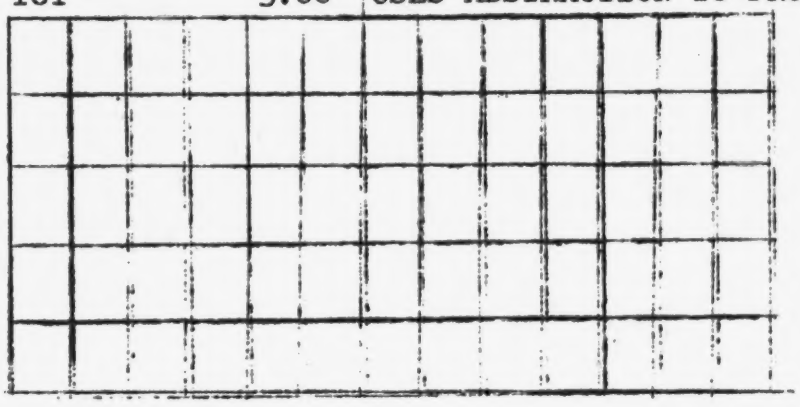
2.20 PROVOKES AUDITORY IMAGE

2.30 PROVOKES ORG, KIN, OR TACT IMAGE

2.40 PROVOKES OLFACTORY IMAGE

2.50 PROVOKES GUSTATORY IMAGE

TOT 3.00 USES ABSTRACTION TO PROVOKE IMAGERY



3.10 PROVOKES VISUAL IMAGE

3.20 PROVOKES AUDITORY IMAGE

3.30 PROVOKES ORG, KIN, OR TACT IMAGE

3.40 PROVOKES OLFACTORY IMAGE

3.50 PROVOKES GUSTATORY IMAGE

Implications

It is the opinion of the writer that this study can serve to broaden understanding in education in several ways. First, the merging of developmental levels with imagery in the developed taxonomy adds a new dimension to the area of cognitive development, perhaps leading to further research along this line.

Secondly, the ability of the instrument to provide a qualitative and quanitative measure of image provoking behavior on the part of the teacher enables investigators to focus on the influence of any such measured behavior.

The effect of a highly concrete-image teacher on high, average, and low achieving students could be explored. Likewise the response of these three types of students to a highly representational learning atmosphere could be determined.

Similarly the effects of all types of teacher behavior measured by this instrument on pupils at different age levels as well as differences between responses by sex group or even socio-economic level could be investigated.

It would be of interest to correlate the score of a given teacher on the Taxonomy of Image Provoking Behavior with other instruments used in systematic observation to determine if there is a relationship between image provoking behavior and such commonly measured teacher attributes as dogmatism, experimentalism and process versus subject matter orientations. For that matter, might there not exist a relationship between classroom management or teacher-student interaction and the factors measured by the TIP Profile? A research study now underway seeks to answer some of these questions.

This investigation has important implications for teacher competency studies. As a measure of teacher behavior, the TIP Profile can be used alone or in conjunction with other systematic observation instruments and other evaluative techniques and procedures in obtaining a more complete picture of any given teacher's behavior and effectiveness.

During the past year, the TIP Profile has been utilized in the teacher training program at West Virginia University. In addition to developing the skills necessary to use the instrument in observations of simulated teaching, the pre-service teachers were able to behaviorally demonstrate the various TIP levels so as to achieve any profile requested. The fact that they were able to modify their scores at will is evidence of an increased versatility in dealing with the presentation of subject matter at any given cognitive level. They can be considered more competent to vary their behaviors to match the level of any given student population to the complexities of subject matter.

Work with numbers of pre-service and in-service teachers by the writer suggests a very strong relationship between what is commonly described as creativity and the ability of these teachers to provide appropriate image-related cognitive experiences for their students.

At a minimum, the least sophisticated teacher trainee has been able to utilize the TIP Profile as an "organizer" for facilitating flexible movement within the concrete to abstract continuum.

The instrument reaches its greatest strength when used in the self-evaluation of the individual teacher. The use of systematic observation as the mechanism which provides behavioral feedback to the teacher realizes the full possibilities of the concept. Systematic observation provides the data which will enable the teacher to control his own behavior in specific and knowledgeable ways. The possibility of teachers being able to control their own behavior can well revolutionize the teaching profession. For when teachers can plan and predetermine their own behavior in specific terms, instruction can move from the cloudy mystic realm of intuitive hunches into the full light of scientific method.

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